

# Panel: Inference from Internet Auction Data

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# Three (statistically significant) points

- Sampling is an issue
- Visualization is a necessity
- Auction dynamics are important

# Sampling Auction Data

- Data collection via web agents
  - Get list of data pages (use website search / other)
  - Collect info from all data pages
- Non-sampling errors
  - Measurement bias (data refreshing, search algorithm, unrecorded data)
  - Selection bias (untruthful, poor website design, web-agent interference, robot restrictions)
- Sampling costs, errors, and issues
  - Fixed (programming) + very negligent per-item
  - Some items/categories harder to collect (legal/technical)
- Sample/Population
  - SRS assumption (is there a sampling frame?)
  - Stratified sampling: increase accuracy (estimate strata size, cat overlap)
  - Cluster sampling: account for concurrency, longitudinal
  - Goal of study (exploratory, descriptive, analytical), parameter of interest (difference?) tolerable error rates

# Example: What % of eBay auctions transact?

- Define population (when, where, type of transactions)
- Collect Sample
  - Stratify by category (top level)
  - Estimate sub-pop size from current category size
  - Look at all closed auctions, record % transacting, sample size
- Compute estimate + error

The screenshot shows the eBay 'All Categories' search interface. At the top, there's a search bar with a placeholder 'Search titles & descriptions' and a 'Search' button. Below the search bar is a 'Browse Categories' section with dropdown menus for 'Category' (set to 'All Categories'), 'Format' (set to 'All Items'), 'Listings' (set to 'All Active'), and 'Location' (set to 'Available on'). There are two radio buttons: one for 'Show number of items in category' (selected) and one for 'Show category numbers'. The main area displays a list of categories under 'Antiques' (176551), which is highlighted with a yellow background. Other categories listed include 'Computers & Networking' (388322), 'Apple, Macintosh Computers' (9162), 'Desktop PC Components' (53366), 'Desktop PCs' (7508), 'Drives, Controllers & Storage' (28244), 'Input Devices' (14149), 'Laptop Parts & Accessories' (53816), 'Laptops' (17973), 'Monitors & Projectors' (5557), 'Networking' (55209), 'Printers' (13231), 'Printer Supplies & Accessories' (51713), 'Scanners' (1712), 'Software' (62652), 'Technology Books' (7123), 'Vintage Computing Products' (2160), and 'Other Hardware & Services' (4747). At the bottom of the list, there are links to 'See all Antiques categories...' and 'See all Computers & Networking categories...'.

Category	Format	Listings	Location
All Categories	All Items	All Active	Available on
<input checked="" type="radio"/> Show number of items in category	<input type="radio"/> Show category numbers		
<a href="#">Antiques</a> (176551)			<a href="#">Computers &amp; Networking</a> (388322)
<a href="#">Antiquities (Classical, Amer.)</a> (6599)			<a href="#">Apple, Macintosh Computers</a> (9162)
<a href="#">Architectural &amp; Garden</a> (10155)			<a href="#">Desktop PC Components</a> (53366)
<a href="#">Asian Antiques</a> (30462)			<a href="#">Desktop PCs</a> (7508)
<a href="#">Books, Manuscripts</a> (2983)			<a href="#">Drives, Controllers &amp; Storage</a> (28244)
<a href="#">Decorative Arts</a> (28873)			<a href="#">Input Devices</a> (14149)
<a href="#">Ethnographic</a> (4023)			<a href="#">Laptop Parts &amp; Accessories</a> (53816)
<a href="#">Furniture</a> (12571)			<a href="#">Laptops</a> (17973)
<a href="#">Maps, Atlases, Globes</a> (7941)			<a href="#">Monitors &amp; Projectors</a> (5557)
<a href="#">Maritime</a> (3362)			<a href="#">Networking</a> (55209)
<a href="#">Musical Instruments</a> (807)			<a href="#">Printers</a> (13231)
<a href="#">Primitives</a> (8801)			<a href="#">Printer Supplies &amp; Accessories</a> (51713)
<a href="#">Rugs, Carpets</a> (10801)			<a href="#">Scanners</a> (1712)
<a href="#">Science &amp; Medicine</a> (1676)			<a href="#">Software</a> (62652)
<a href="#">Silver</a> (26538)			<a href="#">Technology Books</a> (7123)
<a href="#">Textiles, Linens</a> (12824)			<a href="#">Vintage Computing Products</a> (2160)
<a href="#">Other Antiques</a> (8135)			<a href="#">Other Hardware &amp; Services</a> (4747)

# Visualization

- Auction rules
- Skewed variables (price, rating, #bids...)
- Validation
- Interplay of multiple factors
- Discrete/cont

## eBay.com Bid History for

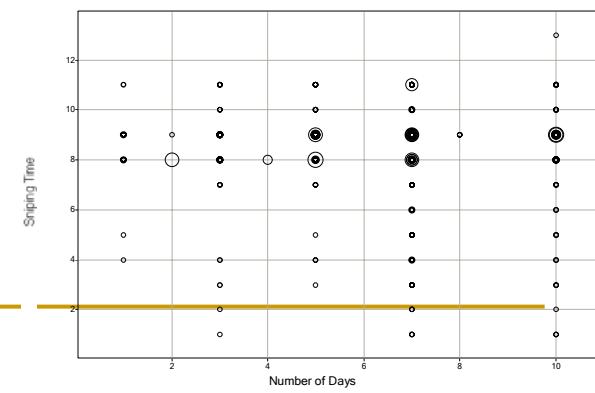
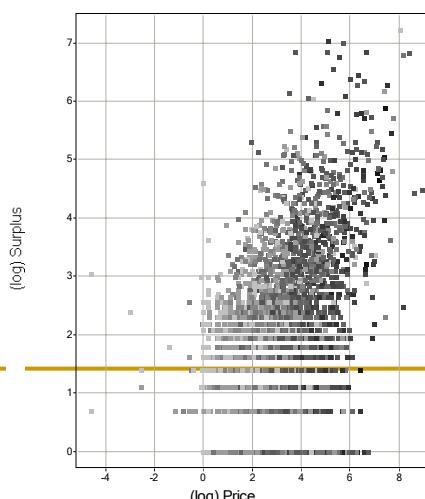
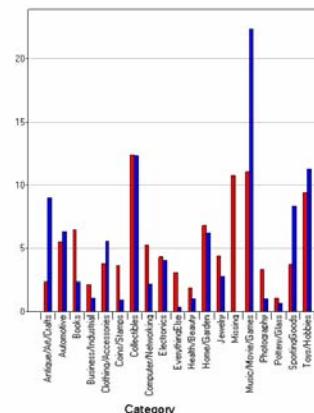
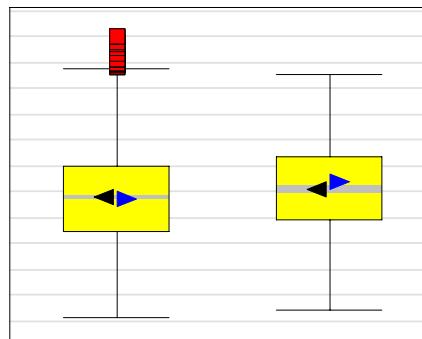
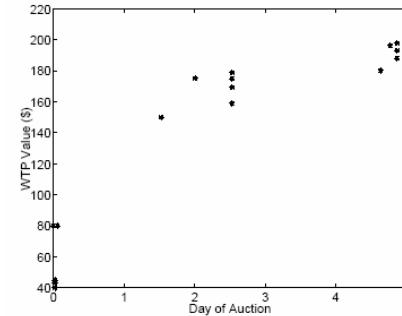
Palm Pilot mc15 Color Handheld PDA 515 NEW NR (Item # 3071620984)

Current US \$200.50  
Quantity 1  
Time left Auction has ended.  
Started Jan-28-04 20:30:00 PST  
Ends Feb-02-04 20:30:00 PST  
Seller (Pending) misagent (121 ★)

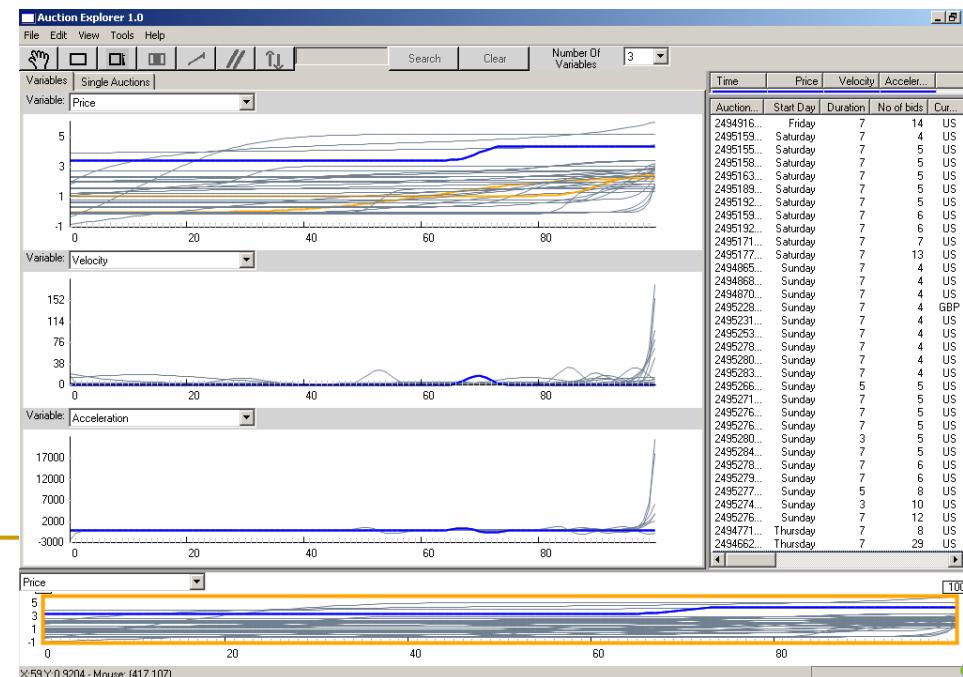
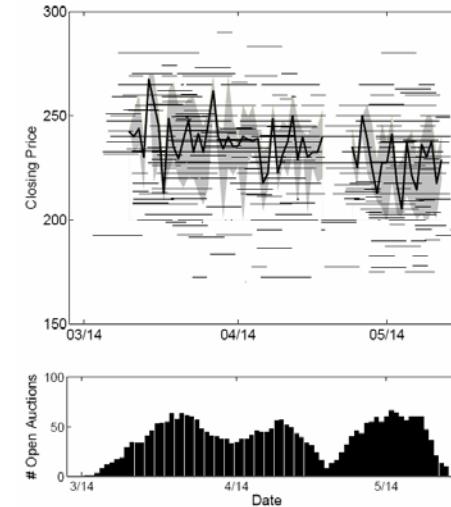
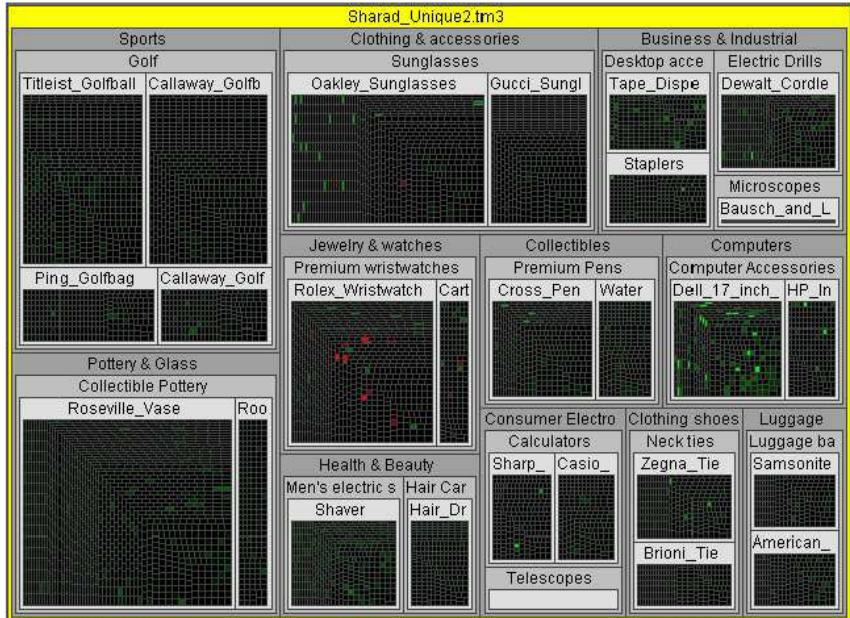
[View page with email addresses](#) (Accessible by seller only) [Leave a note](#)

### Bidding History (Highest bids first)

User ID	Bid Amount	Date of Bid
golopiss (26 ★)	US \$200.50	Feb-02-04 20:28:02 PST
angels (1) ⚡	US \$198.00	Feb-02-04 17:18:14 PST
jeanblue (8) ⚡	US \$196.50	Feb-02-04 14:37:54 PST
rooker (1) ⚡	US \$193.00	Feb-02-04 17:17:59 PST
andrea (1) ⚡	US \$188.00	Feb-02-04 17:17:33 PST
single2ic (11 ★)	US \$180.25	Feb-02-04 11:48:20 PST
andrea (1) ⚡	US \$179.00	Jan-31-04 09:18:51 PST
angelaex (15 ★)	US \$175.25	Jan-30-04 20:45:20 PST
andrea (1) ⚡	US \$175.00	Jan-31-04 09:18:37 PST
andrea (1) ⚡	US \$169.55	Jan-31-04 09:18:16 PST
andrea (1) ⚡	US \$159.00	Jan-31-04 09:17:40 PST
andrea_3weeks (14 ★)	US \$150.00	Jan-30-04 09:12:58 PST
andrea (1) ⚡	US \$90.05	Jan-28-04 21:54:09 PST
scott24 (12 ★)	US \$80.00	Jan-28-04 20:35:55 PST
powergerbil (1)	US \$43.01	Jan-28-04 21:05:14 PST
powergerbil (1)	US \$42.99	Jan-28-04 21:04:44 PST
powergerbil (1)	US \$40.00	Jan-28-04 21:04:08 PST



# Visualization: special data structures



# Information in Auction Data

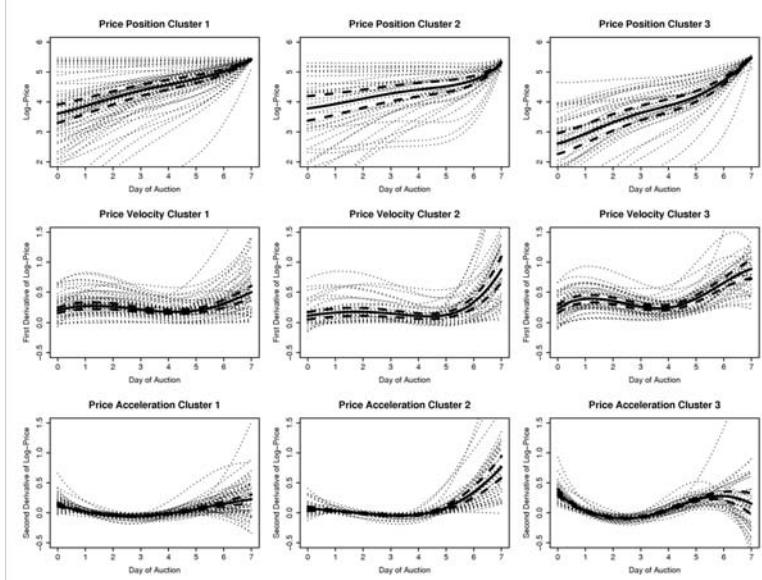
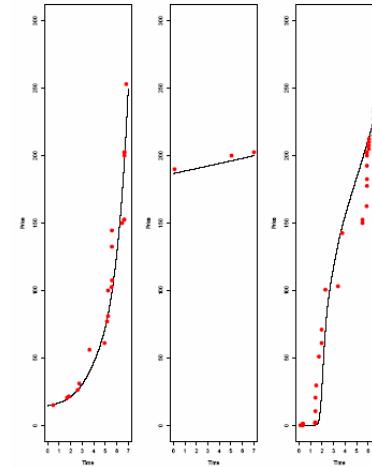
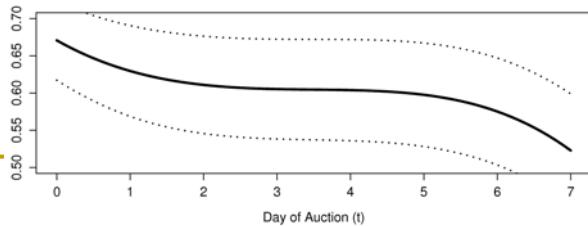
- Current research uses mostly a snapshot

AuctionID	Price	# Bids	# Bidders	Open Bid	Duration	Category	winnerId	winnerRating	sellerId	sellerRating	Currency
2242934096	860	50	16	0.01	10	Tickets & Travel	meigsmike	4	alphapenguin	119	US
8104666657	9.57	7	6	0.5	10	Collectibles	firebird16	66	jscomics	5703	US
2243064894	62.99	14	11	0.99	10	Collectibles	moto26	853	sf.bay.trader	2760	US
2243273716	389	18	12	50	10	Collectibles	beancounte	32	morphling88	325	US
3723066321	6.99	1	1	6.99	7	Collectibles	wadeltons	5	prime-star	25433	US
2243514515	11.5	1	1	11.5	7	Collectibles	sullee-socc	125	prime-star	25433	US
2243538083	11.5	7	2	3.99	7	Collectibles	mminnie	98	mickeyjj77	81	CA
2243580975	6.5	3	2	2.99	7	Collectibles	sandyreser	177	rankens-toys	3385	US
3815779306	5.5	2	2	2.99	7	Collectibles	sandyreser	177	rankens-toys	3385	GBP
2243581144	5.5	2	2	2.99	7	Collectibles	sandyreser	177	rankens-toys	3385	US
3912166297	2.99	1	1	2.99	7	Collectibles	djleeds	56	rankens-toys	3385	AU
2243609083	74.75	12	8	5	7	Collectibles	junk-sales	136	deb*bee	387	US
4012045841	36	7	3	5	7	Collectibles	ufantastik%	33	deb*bee	387	US

- Some of these change during the auction

# Auction Dynamics

- What goes on *during* the auction is informative
- Price process and price dynamics
- Effect of various factors (open bid,...)
- Economic theory?
- Functional Data Analysis!



# Final words

- Special data structures allow more advanced techniques, new Qs
- New findings can add directions for developing new (online) theory
- Exploratory data analysis is foundation of formal modeling